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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,833	10/22/2003	Paul E. Denney	LOMASR.023A	5409

20995 7590 06/30/2010

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EXAMINER	
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ART UNIT	PAPER NUMBER
3742	

NOTIFICATION DATE	DELIVERY MODE
06/30/2010	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PAUL E. DENNEY, JAY R. EASTMAN, and
PAUL M. FALLARA

Appeal 2009-006007
Application 10/690,833
Technology Center 3700

Decided: June 28, 2010

Before: LINDA E. HORNER, JENNIFER D. BAHR, and KEN B. BARRETT, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Paul E. Denney et al. (Appellants) appeal under 35 U.S.C. § 134 (2002) from the Examiner's decision rejecting claims 1-22 under 35 U.S.C. § 103(a) as being unpatentable over Uraki (US 5,977,515, issued Nov. 2, 1999), Otsubo (US 6,507,000 B2, issued Jan. 14, 2003), Freiwald (US 6,693,255 B2, issued Feb. 17, 2004), and Di Curcio (US 3,369,101, issued Feb. 13, 1968). We have jurisdiction over this appeal under 35 U.S.C. § 6 (2002).

The Invention

Appellants' claimed invention is directed to an apparatus for drilling, cutting, and surface processing of materials using energy waves. Spec., para. 3.

Claim 1, reproduced below, is illustrative of the claimed subject matter.[1]

> 1. A laser head adapted to irradiate an interaction region of an inhabitable structure with laser light to remove material from the structure, the laser head comprising:
>
> a housing;
>
> a connector coupled to the housing and optically coupled to a laser generator, the connector adapted to transmit laser light from the laser generator;
>
> at least one optical element contained in the housing and optically coupled to the connector, the optical element adapted to receive laser light from the connector; and

[1] Claim 19, the only other independent claim involved in this appeal, differs from claim 1 in that it does not recite a housing, and recites means for connecting, means for receiving the laser light, means for guiding the laser light, and means for confining and removing material from the interaction region in place of the connector, at least one optical element, and containment plenum.

> a containment plenum coupled to the housing, the containment plenum optically coupled to the optical element to receive the laser light from the optical element, the containment plenum adapted to confine the material and remove the material from the interaction region resulting from irradiating the structure with the laser light, wherein the containment plenum is cooled by a cooling medium flowing through a coolant conduit of the containment plenum, the coolant conduit fluidly coupled to a source of the cooling medium that is spaced from the containment plenum.

SUMMARY OF DECISION

We REVERSE.

OPINION

The Examiner found that Uraki lacks a means for removing the debris (i.e., a containment plenum). Ans. 3. The Examiner found that Otsubo discloses a dust collector for a laser-drilling machine (*id.*), and concluded that it would have been obvious to use a containment collector as taught by Otsubo in the Uraki system to remove debris from the working zone to yield an optimum product (Ans. 3-4). The Examiner further found that Freiwald discloses a system for laser ablation and cleaning comprising a cleaning head with a nozzle and a powered vacuum and filtration unit for removing material and vapor ablated from the workpiece, wherein the cleaning head must permit ambient air to enter the nozzle to cool the ablated material and entrain and dilute the material for easier filtration. Ans. 4; *see* Freiwald, col. 5, ll. 27-29, 41-43. The Examiner also found that Freiwald teaches the use of water cooling for high-powered lasers. Ans. 4. The Examiner additionally found that Di Curcio "discloses a conduit for cooling fluids to

the optical region." Ans. 4. In particular, we find that Di Curcio describes blower motor 60 which delivers cooling gas through conduit 61 to the optical cavity of a laser head 10 to cool the laser rod and flash-lamp. Di Curcio, col. 4, ll. 24-30. The Examiner concluded it would have been obvious to use air cooling or water cooling as taught by Freiwald in the Uraki system to cool the machining debris to negate contamination effects on the optics and potential redeposition of debris on the workpiece surface, and to use a cooling conduit as taught by Di Curcio in the Uraki system "because it is merely a part of the cooling system." Ans. 4.

Appellants argue, *inter alia*, that none of the applied references, or their combination, discloses or suggests a containment plenum, or confining means, which is cooled by a cooling medium flowing through a coolant conduit of the containment plenum or confining means. App. Br. 6-7; Reply Br. 4-6. Accordingly, the issue raised in this appeal is whether the Examiner has established that the combined teachings of Uraki, Otsubo, Freiwald, and Di Curcio render obvious a laser head having a containment plenum or confining means for confining and removing material from the interaction region, wherein the containment plenum or confining means is cooled by a cooling medium flowing through a coolant conduit of the plenum or confining means, as called for in claims 1 and 19.

The Examiner has not pointed to any explicit teaching in either Uraki or Otsubo directed to cooling. Freiwald discloses permitting ambient air to enter nozzle 27 of the cleaning head to cool, dilute, and entrain ablated material entering a capture chamber 26 of nozzle 27 (col. 5, ll. 41-44), and further teaches water cooling reflective optics, such as mirrors, for high-powered lasers (col. 8, ll. 47-48). Further, Freiwald teaches that "[a]blated

material is diluted and partially cooled by the air stream flowing into the capture chamber 26" (col. 6, ll. 62-63). As noted above, we further find that Di Curcio describes a blower for delivering cooling gas through a coolant conduit to the optical cavity of a laser head to cool the laser rod and flash-lamp. Di Curcio, col. 4, ll. 24-30. The Examiner has not pointed to any disclosure, and we find no disclosure, in any of the applied references directed to cooling of the material removal plenum or confining means. We agree with Appellants that "cooling of the laser processed materials does not equate to cooling of the plenum." *See* Reply Br. 8. Specifically, the Examiner has not pointed to any evidence in the record to establish that a person of ordinary skill in the art would have recognized that the containment plenum, or confining means, itself would require cooling.

The Examiner has asserted that "from a common sense perspective; generally speaking, most machining operations require some form of cooling. Thus it would be within the level of ordinary skill at the time of the invention to use cooling during laser machining." Ans. 18. The Examiner's assertion, as far as it goes, is supported by the teachings of Freiwald and Di Curcio, which discuss the need for cooling of the ablated material and of the optical elements, laser rod, and flash-lamp in the laser head. In other words, the evidence provided by the Examiner adequately supports the conclusion that it would have been obvious to provide cooling in the laser head of Uraki, to cool and entrain the ablated material, and to cool the laser rod, flash-lamp, and optical elements for directing the laser. There is no evidence in the record before us, however, that a person of ordinary skill in the art, in the absence of the teachings in Appellants' Specification and claims, would have had reason to provide cooling for the containment

plenum, or confining means, in particular, of Uraki's laser head, as called for in claims 1 and 19.

In addressing the requirement for cooling of the plenum, or confining means, the Examiner appears to have resorted to a theory of inherency. *See* Ans. 14, 17, 20. In particular, the Examiner reasoned that since it is well known that flowing medium is "generally" used for cooling, Uraki's teaching of a flowing medium (gas injecting mechanism 15) "inherently teaches cooling of the plenum (compartment 3)." *Id.* The Examiner pointed out that flowing medium, including water, gas, inert gas, dry gas, and air is contained within the plenum (compartment 3). *Id.* Thus, according to the Examiner, since Uraki operates underwater, there is inherent cooling from the large body of water outside the chamber 2, as well as from the injected gas from gas injecting mechanism 15. Ans. 17. The Examiner's reasoning misapplies the theory of inherency. Under principles of inherency, when a reference is silent about an asserted inherent characteristic, it must be clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). Inherency may not be established by mere probabilities or possibilities. *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981). While the temperature of the surrounding water, and even that of the injected inert gas, *may* be lower than that of the containment plenum or confining means (chamber 3), the Examiner has not pointed to any teaching in Uraki of the relative temperatures of the water, injection gas, and chamber, or provided any technical reasoning to explain why the water or gas *necessarily* would

be lower in temperature. In fact, Uraki explicitly describes the injection gas as being "a dry gas heated at a high temperature" (col. 8, ll. 27-28).

For the above reasons, we conclude that the Examiner has not established that the combined teachings of Uraki, Otsubo, Freiwald, and Di Curcio render obvious a laser head having a containment plenum or confining means for confining and removing material from the interaction region, wherein the containment plenum or confining means is cooled by a cooling medium flowing through a coolant conduit of the plenum or confining means, as called for in claims 1 and 19, and the claims depending therefrom.

DECISION

The Examiner's decision is reversed.

REVERSED

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